APPARATUS AND METHODS FOR ROUTING OF OPTICAL BEAMS VIA TIME-DOMAIN SPATIAL-SPECTRAL FILTERING

Abstract of the Disclosure

Apparatus and methods are disclosed for spatially routing an optical pulse (data pulse) of an electromagnetic radiation and containing a specific address temporal profile and possibly additional data. Routing generally involves a unit of active material that is programmed using one or more input beams or pulses of the electromagnetic radiation providing address (i.e., waveform-discriminating) and directional (i.e., pulse routing) information to the active material. During programming, a spatial-spectral grating is created by optical interference on or in the active material of the input pulses encoding the address and directional information pertinent to the data pulse. Whenever a data pulse, encoding a temporal profile that is substantially similar to the temporal profile of the address, interacts with the grating in or on the active material, the active material produces an output pulse that propagates in a direction, relative to the material, corresponding to the directional information provided during programming.